

Quarterly Report
Covering April 1, 2005 to June 30, 2005
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Project Title

Fish Passage in Montana Culverts Phase II – Passage Goals

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Introduction

This progress report covers work completed between April 1, 2005 and June 30, 2005. Work on the project during this period has been primarily devoted to installation and testing of field equipment, trapping fish for tagging, and the onset of data collection.

Project Objective

Culverts are a common and often cost effective means of providing transportation intersections with naturally occurring streams or rivers. Fish passage and fish habitat considerations are now typical components of the planning and design of waterway crossings. Many culverts in Montana span streams that support diverse fisheries. The health of these fisheries is an essential element of a recreational industry that draws hundreds of thousands of visitors to Montana annually. Transportation system planners, designers and managers recognize that fish passage through Montana's culverts is a concern. However, there is much contention concerning the impact that a culvert can have on a fishery. Recent basin-wide studies in Montana (Phase I of this project - final report in November 2004) indicate that the tools that some planners and designers promote for forecasting fish passage concerns may be overly conservative. This is

reflected in the diversity of fish passage goals that are being considered by state agencies in the Northwest. Some managers contend that all culverts should pass all fish at all times, whereas others suggest that this is an unrealistic criterion, particularly during high flow events. Which species, life stages, and how many individuals must have fish passage access for how long, are questions that are often brought forward during discussions on the design and retrofitting of culverts to accommodate fish passage concerns. *The problem is that for fish species and settings in Montana, the timing and number of fish that must pass a culvert to maintain viable species diversity in the watershed is unknown.*

Progress

PIT (Passive Integrated Transponder) tags were chosen to directly measure the success or failure of individual fish in navigating the culverts in the study area. The tags are small electronic devices that are inserted beneath the flesh of the fish and remain there for the life of the fish. We have secured Montana FWP permits to trap and tag 100 Yellowstone cutthroat trout and 50 rainbow trout.

A trap has been installed on Mulherin Creek near the confluence with the Yellowstone river (Figure 1). Fish are intercepted in their spawning run at the trap. All trapped fish are released just upstream of the trap to continue their run. Fish are selectively tagged to represent the distribution of sex and size classes in the spawning run.

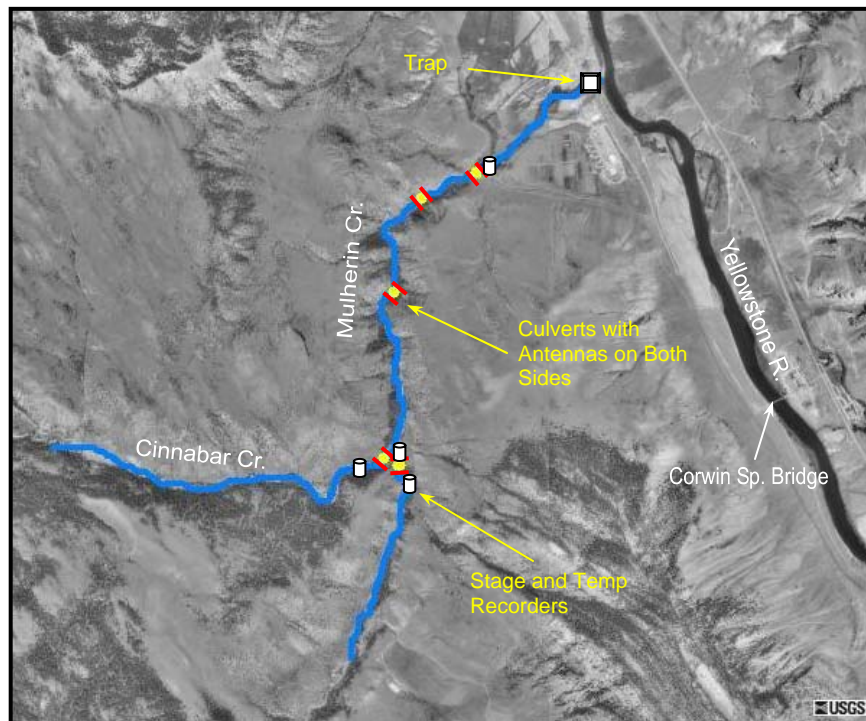


Figure 1. Location of culverts, trap, stage recorders and PIT antennas in the study area.

Each of the five culverts in the study area have been equipped with PIT antennas to record the passage of tagged fish. An example is shown in Figure 2. The tagged fish must pass through the antenna loop to register, so the antenna wire is looped around the outer lip of the culvert, and suspended above the water level. Each antenna must be individually “tuned” after installation, and the tuning must be checked periodically. Each culvert installation consists of two antennas (one upstream and one downstream of the culvert), a box containing the tuning electronics, a signal conditioner, a palm pilot for data logging and a 12 volt deep cell battery to energize the antenna. The battery must be replaced with a freshly charged battery every 4 to 6 days. Otherwise, the system is self contained and only needs to be checked for physical condition and tuning every few days. The recording systems for all five culverts in the study area have been fully deployed and operational since late May, 2005.



Figure 2. PIT antenna on the outlet of culvert 2.

The Yellowstone cutthroat trout have only just started their spawning run as of this report. As such, we have tagged and released 8 fish, several of which have already been detected as passing culverts 1 through 3.

Another important component of the study is the collection of hydraulic data to overlay on the fish passage information. Four automated stage and temperature recorders have been deployed as shown in Figure 1. Each recorder logs water depth, water temperature and air temperature on 15 minute intervals. Velocimeter data has also been recorded to develop a flow-discharge curve for each stage recorder. The flow data has been recorded at a variety of medium to high flow rates, and several low-flow observations will be

added to provide robust stage discharge curves for each site. Each culvert has been surveyed and spot checks of water depth and velocity measurements are ongoing.

Budget

Actual expenditures to date have begun to catch up with planned expenditures because of the large purchases (PIT tags, antennas, electronics, and stage recorders) this spring. Expenditures to date continue to include graduate student stipends and tuition expenses as well as travel to and from the field site.

